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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/622,015	07/17/2003	Daniel C. Cowles	Serie 6184	1695
40582	7590	12/08/2006	EXAMINER	
AIR LIQUIDE 2700 POST OAK BOULEVARD, SUITE 1800 HOUSTON, TX 77056			WALLENHORST, MAUREEN	
			ART UNIT	PAPER NUMBER
			1743	

DATE MAILED: 12/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/622,015

Applicant(s)

COWLES ET AL.

Examiner

Maureen M. Wallenhorst

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 November 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-60 is/are pending in the application.
- 4a) Of the above claim(s) 1-34 and 48-52 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 35-47 and 53-60 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-60 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 12/19/03
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

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1. Applicant's election without traverse of Group II, claims 35-47 and 53-60 in the reply filed on November 13, 2006 is acknowledged.
2. Claims 56-60 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

On line 5 of claim 56, the phrase "said processing of semiconductor wafers" lacks antecedent basis since the workpieces were not positively recited as being semiconductor wafers. On lines 5-6 of claim 56, the phrase "wherein the chlorosilane" is indefinite since nothing is recited after this phrase, and therefore, it does not make proper sense.

On lines 2-3 of claim 58, the phrase "said process controller unit" should be changed to – said process controller—so as to be consistent with the terminology used earlier in the claim.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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5. Claims 35-47 and 53-60 are rejected under 35 U.S.C. 102(b) as being anticipated by Cowles et al (from SEMI Technical Symposium: Innovations in Semiconductor Manufacturing, submitted in the Information Disclosure Statement filed on December 19, 2003).

Cowles et al teach of a method and system for analyzing metals in halosilane supplies. The system is a point-of-use system for the quantification of metal impurities in trichlorosilane. The system comprises 1) a halosilane source or supply line such as a process tool that processes semiconductor wafers or a trichlorosilane (TCS) source gas canister, 2) a reaction system in the form of an impinger containing a reaction vessel having an aqueous solution of hydrofluoric acid therein, 3) a halosilane gas sampling line, 4) an inert shield gas supply line, and 5) an aqueous caustic scrubber (i.e. abatement unit) connected to the reaction vessel by an exhaust line for carrying exhaust produced from the reaction of the halosilane with the aqueous hydrofluoric acid away from the reaction vessel. Cowles et al teach that the TCS canister, sampling apparatus, impinger and abatement cell can be made from PTFE or PFA, and are contained in a gas cabinet. In order to perform a method of detecting metal impurities in a halosilane sample using the apparatus taught by Cowles et al, a sample of a halosilane is directed into the reaction vessel of the impinger to react with the aqueous hydrofluoric acid therein. After the hydrolysis reaction, the reaction mixture is evaporated to near dryness using an evaporation system. The dried sample is then reconstituted with an aqueous solution of HNO₃ and H₂O₂. This sample is then analyzed by a metal detector in the form of an inductively coupled plasma-mass spectrometer (ICP-MS). The specific metals that can be detected using this system include boron, manganese, iron, molybdenum, tin, titanium and chromium. Cowles et al teach that the metals can be detected at levels of less than one ppbw.

Since the publication date of this Cowles et al reference is only listed as July 2002, the exact day on which it published in July 2002 is not known. In the absence of any evidence from the inventors that the Cowles et al reference was actually published on or after July 17, 2002, it is being assumed that the Cowles et al publication was published more than one year from the effective filing date of the instant application, which is July 17, 2003, and qualifies as prior art under 35 USC 102(b).

6. Claims 35, 37, 45, 47 and 53-54 are rejected under 35 U.S.C. 102(b) as being anticipated by Chen et al (article submitted in the Information Disclosure Statement filed on December 19, 2003).

Chen et al teach of a method and system for determining trace levels of the metal boron in silicon and chlorosilane samples. Chen et al teach that the method and system are useful to control the level of metal impurities in silane materials used in the manufacture of semiconductor materials. The system comprises a halosilane supply source that provides a sample of a halosilane such as dichlorosilane or trichlorosilane, a reaction system in the form of a PTFE beaker that contains an aqueous solution of hydrofluoric acid for reaction with the halosilane to form a liquid reaction mixture, an evaporator that is used to evaporate the liquid reaction mixture to near dryness, and a metal detector in the form of a spectrophotometer. After the liquid reaction mixture is evaporated to a dry residue, the residue is mixed with liquid H₂SO₄ and carminic acid to develop a colored product, and the absorbance of the product is measured. See Figure 1 and pages 358-359 in Chen et al.

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35

U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claims 36, 46, 53-54, 56-58 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. For a teaching of Chen et al, see previous paragraphs in this Office action.

Chen et al fail to teach that the halosilane supply source is a halosilane canister, bulk storage tank, etc., fail to teach that a concentration level of less than one ppbw of the boron is detected in the halosilane sample, fail to teach that the halosilane supply source is coupled to a processing tool for processing semiconductor workpieces, and fail to teach of a process controller for controlling the operation of the various parts of the apparatus. However, it would have been obvious to one of ordinary skill in the art to provide the halosilane supply source taught by Chen et al from a canister or bulk storage tank since Chen et al teach that the halosilane samples analyzed are usually used in the manufacturing of semiconductor materials, and halosilanes are used in such manufacturing processes in the form of canisters or storage tanks. It also would have been obvious to one of ordinary skill in the art to detect boron in the

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halosilane samples analyzed in the system taught by Chen et al at very low ppbw levels, similar to that recited in the instant claims, since Chen et al teach that boron can be measured in very low concentration levels such as micrograms/ml and nanograms/ml. See Figure 2a, b in Chen et al. It also would have been obvious to one of ordinary skill in the art to use a halosilane supply source in the system taught by Chen et al that is coupled to a processing tool for processing semiconductor workpieces since Chen et al teach that the halosilane samples analyzed are usually used in the manufacturing of semiconductor materials. In addition, it would have been obvious to one of ordinary skill in the art to incorporate a process controller into the apparatus taught by Chen et al for controlling the operation of the various different parts of the system so as to automate the method of detecting boron in halosilane samples, thus making the method more efficient and quicker to perform without the requirement for manual input.

10. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al in view of the abstract from the article entitled "ICP Emission Spectroscopy Determination of Trace Amounts of Manganese, Iron, Chromium, Vanadium, Titanium, Copper, Nickel and Cobalt" from Fenxi Huaxue. For a teaching of Chen et al, see previous paragraphs in this Office action. Chen et al fail to teach that the boron metal in the halosilane samples can be detected using inductively-coupled plasma emission spectroscopy.

The abstract noted above teaches that trace amounts of metals such as Mn, Fe, Cr, V, Ti, Cu, Ni and Co in a halosilane sample can be determined by emission spectroscopy with an inductively-coupled plasma source. In the method, a halosilane sample is combined with HF to produce a liquid reaction mixture, the mixture is evaporated to dryness and then reconstituted with HCL and water, and measured by ICP-MS.

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Based upon the combination of Chen et al and the abstract, it would have been obvious to one of ordinary skill in the art at the time of the instant invention to detect the boron in the halosilane samples taught by Chen et al using inductively-coupled plasma emission spectroscopy as the metal detector since the abstract teaches of a very similar method for detecting metals in halosilane samples, and discloses that ICP-MS is an effective detection method for these metals that is equivalent to the spectrophotometric method taught by Chen et al.

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Please make note of: Cowles et al, Kray and Tzou who teach of different methods for detecting metal impurities in chlorosilane samples.

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12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maureen M. Wallenhorst whose telephone number is 571-272-1266. The examiner can normally be reached on Monday-Thursday from 6:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden, can be reached on 571-272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Maureen M. Wallenhorst
Primary Examiner
Art Unit 1743

mmw

November 30, 2006

Maureen M. Wallenhorst
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PRIMARY EXAMINER
GROUP 1 1700